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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/625,493	07/25/2000	Morio Gaku	2000-1033A	6721

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EXAMINER	
PIERCE, JEREMY R	

ART UNIT	PAPER NUMBER
1771	

DATE MAILED: 09/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/625,493	GAKU ET AL.	
	Examiner	Art Unit	
	Jeremy R. Pierce	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1 and 3-5* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1 and 3-5* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on May 23, 2005 has been entered.

Response to Amendment

2. Applicant's amendment filed on May 23, 2005 has been entered. Claim 1 has been amended. Claim 2 has been cancelled. Claims 1 and 3-5 are currently pending.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1 and 3-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishii et al. (U.S. Patent No. 5,368,921) in view of Sakaguchi et al. (EP 768,814), Touzaki (JP 11-77892), and Kawakita et al. (U.S. Patent No. 5,817,404).

Ishii et al. provide a metal foil-clad laminate obtained by lamination molding a resin-impregnated substrate and a metal foil (column 2, lines 22-24). The resin is dissolved in a solvent (column 4, line 50). Ishii et al. teach the thermosetting resin is blended with inorganic filler in the amount of from 10 to 45% by weight based on the total amount of the resin solid or from 5 to 30% by weight of the substrate (column 4, lines 6-19). The substrate can be a woven glass fabric with a preferred thickness as low as 50 microns (column 2, lines 57-66), but Ishii et al. fail to teach the thickness to be between 25 and 40 microns and also fail to provide the basis weight of the glass fabric. Sakaguchi et al. teach that implementing thinner printed wiring boards are advantageous because higher functions can be achieved with lower weights and size (page 2, lines 25-28). Sakaguchi et al. teach the thickness of a woven fabric in the prepreg should be lower than 60 microns (page 2, line 27) and teach a specific embodiment where the glass fabric is 30 microns thick (page 2, line 34). Sakaguchi et al. disclose that a woven glass cloth for circuit boards may be used that has a basis weight of only 15 to 30 grams per square meter (Abstract). Sakaguchi et al. teach that such smaller and lightweight glass fabrics can be provided without sacrificing strength properties (page 2, lines 47-55). It would have been obvious to a person having ordinary skill in the art at the time of the invention to use a glass fabric having a thickness of 30 microns weighing between 15 and 30 grams per square meter in the circuit board of Ishii et al. in order to provide a lightweight material with increased uses without sacrificing strength, as taught by Sakaguchi et al.

Ishii et al. also do not teach the gas permeability of the glass fabric. Touzaki teaches the permeability of glass fabrics for making a copper-clad laminate is preferably 1-15 $cc/cm^2/sec$ to obtain a laminate where air bubbles aren't present and the resin constituent sufficiently sinks into the glass fabric (Paragraph 10). It would have been obvious to one having ordinary skill in the art to use a glass fabric with a permeability between 1-15 $cc/cm^2/sec$ in the laminate of Ishii et al. in order to have the resin sufficiently sink into the prepreg without forming air bubbles, as taught by Touzaki.

Finally, although all of the above references are directed to printed circuit boards, none of the references teach making a small diameter hole in the material with a carbon dioxide gas laser. Kawakita et al. teach that higher performance is achieved in printed circuit boards by making inner-through-hole connections (column 1, lines 10-31). Kawakita et al. also teach that small-diameter, i.e. 0.15 mm, holes are made by using a carbon dioxide laser (column 10, lines 45-51). It would have been obvious to a person having ordinary skill in the art at the time of the invention to make small diameter holes in the composite of Ishii et al. in order to improve performance of the circuit board, as taught by Kawakita et al.

With regard to claim 3, Ishii et al. disclose the prepreg to have 55% weight of resin solid and inorganic filler in his examples (column 5, line 7). Therefore, the glass content of the prepreg must be 45% by weight, which falls within the Applicant's claimed range of 25 to 70% by weight. With regard to claim 4, Sakaguchi et al. teach the preferred thickness of the entire prepreg is between 40 and 80 microns (page 3, line 31). It would have been obvious to a person having ordinary skill in the art at the time of

the invention to make the prepreg of Ishii et al. with a thickness between 40 and 80 microns in order to provide a lightweight material with increased uses without sacrificing strength, as taught by Sakaguchi et al. With regard to claim 5, Ishii et al. disclose using a cyanate ester resin as the thermosetting resin used to impregnate the substrate (column 3, lines 16-18).

Response to Arguments

5. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection. Sakaguchi et al. provide the teaching for the newly claimed thickness of the woven fabric.

6. Applicant's arguments filed May 23, 2005 have been fully considered but they are not persuasive.

7. Applicant argues that Ishii et al. do not disclose the thickness, weight, and gas permeability requirements of the glass woven fabric. Applicant also argues that Ishii et al. do not teach the small-diameter holes. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.,* 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Sakaguchi et al. provide the thickness and weight limitations of the glass woven fabric. Touzaki teaches the gas permeability requirement of the glass woven fabric. And Kawakita et al. teach the small diameter hole limitation

in the claims. Applicant has not shown the combination of these references with Ishii et al. to be erroneous.

8. Applicant argues that Sakaguchi et al. do not disclose either the claimed gas permeability or the small diameter holes. However, the Sakaguchi et al. reference is not used in the 103 rejection to show these features. These features are shown by other references, as set forth above.

9. Applicant argues that Touzaki merely discloses the fiber base material having a specific gas permeability is preferable for the purpose of impregnating the resin fluidized through heating into the fiber base material without leaving air bubbles. However, this still provides motivation for one of ordinary skill in the art to provide Touzaki's gas permeability in the glass fabric of Ishii et al. The motivation for combining the gas permeability taught by Touzaki with the prepreg disclosed by Ishii et al. need not be the same as Applicant's motivation for supplying the claimed permeability in the present invention. A person of ordinary skill in the art would be motivated to use the gas permeability taught by Touzaki in the prepreg of Ishii et al. in order to have the resin sufficiently sink into the prepreg without forming air bubbles, as taught by Touzaki.

10. Applicant argues that Touzaki does not provide the teachings for a small diameter hole. However, the Kawakita et al. reference is used to provide the teaching of making a small diameter hole in a prepreg.

11. Applicant argues that Kawakita et al. do not disclose that through holes are formed in the glass epoxy board with a carbon dioxide laser. However, Kawakita et al. do teach that small diameter holes are formed in printed circuit boards with a carbon

dioxide laser. Since Ishii et al. teach the laminate is used in printed circuit boards, it would be obvious to provide the small diameter holes to improve performance as taught by Kawakita et al.

12. Applicant argues the prepreg of Kawakita et al. has no copper foil. Applicant asserts that when a copper layer is present, a hole cannot be formed unless a larger amount of energy is used than would normally go through glass fabric and resin composition. Applicant also asserts that once a large enough amount of energy is used to burn through the copper, a circular hole cannot be retained. However, Kawakita et al. teach that copper foil can be added to the prepreg after the through holes are formed in the material (Example 1). Applicant's argument is based on a processing limitation (i.e. providing the foil layer before processing the holes). However, Applicant's claims are directed to a product. The holes may be produced in the glass fabric and resin of Ishii et al. and the copper foil can be added afterward, as taught by Kawakita et al. The order of the manufacturing steps does not create a materially different product than the one found in the present claims.

13. Applicant argues that Kawakita et al. do not disclose laser processing conditions for resin composition at all. However, Kawakita et al. disclose that the substrate is a resin impregnated fibrous sheet (see Abstract). Kawakita et al. do teach making inner through holes with a carbon dioxide layer in an aramid-epoxy sheet (column 13, lines 51-57). An aramid-epoxy sheet is similar to a resin impregnated glass fabric because both involve a fibrous substrate impregnated with a polymer. Also, both an aramid-epoxy sheet and a resin impregnated glass fabric are in the same art because both are

used in printed circuit boards. Therefore, it would be obvious to provide small diameter holes in Ishii et al. in light of the teachings of Kawakita et al., as set forth above in the rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeremy R. Pierce whose telephone number is (571) 272-1479. The examiner can normally be reached on normal business hours, but works flextime hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on (571) 272-1478. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JRP

Jeremy R. Pierce
August 31, 2005

ELIZABETH M. COLE
PRIMARY EXAMINER